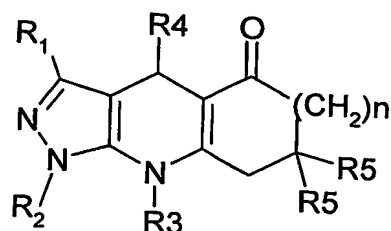


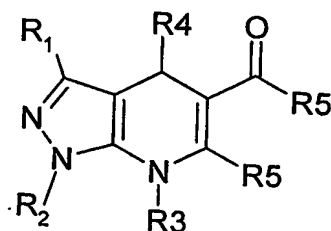
50  
CLAIMS

We claim:

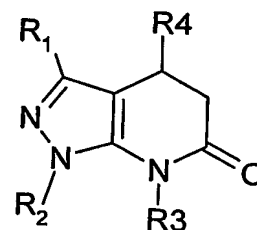
1. A compound having a general structure represented by Formula I, Formula II,  
5 or Formula III;



Formula I



Formula II



Formula III

wherein n is an integer selected from 0 to 2;

R<sub>1</sub> and R<sub>2</sub> are each independently a member selected from the group consisting of  
10 hydrogen, alkyl, alkenyl, aryl, hetaryl, aralkyl, hetaralkyl, alkyl substituted with at least  
one substituent, aryl substituted with at least one substituent, hetaryl substituted with at  
least one substituent, aralkyl substituted with at least one substituent, and hetaralkyl  
substituted with at least one substituent;

R<sub>3</sub> is a member selected from the group consisting of hydrogen, alkyl, alkenyl,  
15 aralkyl, alkyl substituted with at least one substituent, aralkyl substituted with at least  
one substituent, CO-R<sub>5</sub>, SO<sub>2</sub>-R<sub>5</sub>, CO-O-R<sub>5</sub>, CO-N-R<sub>4</sub>, and R<sub>5</sub>; and

R<sub>4</sub> and R<sub>5</sub> are each independently a member selected from the group consisting of  
20 hydrogen, alkyl, alkenyl, cycloalkyl, aralkyl, aryl, alkyl substituted with at least one  
substituent, cycloalkyl substituted with at least one substituent, aryl substituted with at  
least one substituent, and aralkyl substituted with at least one substituent.

2. A compound according to Claim 1, with reference to R<sub>1-5</sub>, whenever the  
following are used;

alkyl is a straight or branched chain C<sub>1-15</sub> alkyl;

cycloalkyl is a C<sub>3-8</sub> cycloalkyl;

25 alkenyl is a straight or branched chain C<sub>2-18</sub> alkenyl;

aralkyl is a carbomonocyclic aromatic or carbobicyclic aromatic substituted with  
a straight or branched chain C<sub>1-15</sub> alkyl; and

substituent is selected from the group consisting of nitro, hydroxy, cyano, carbamoyl, mono- or di-C<sub>1-4</sub> alkyl-carbamoyl, carboxy, C<sub>1-4</sub> alkoxy-carbonyl, sulfo, halogen, C<sub>1-4</sub> alkoxy, phenoxy, halophenoxy, C<sub>1-4</sub> alkylthio, mercapto, phenylthio, pyridylthio, C<sub>1-4</sub> alkylsulfinyl, C<sub>1-4</sub> alkylsulfonyl, amino, C<sub>1-3</sub> alkanoylamino, mono- or di-C<sub>1-4</sub> alkylamino, 4- to 6-membered cyclic amino, C<sub>1-3</sub> alkanoyl, benzoyl, and 5 to 10 membered heterocyclic.

3. A compound according to claim 1, with reference to R<sub>1-5</sub>, whenever the following are used;

aryl is a carbomonocyclic aromatic or carbobicyclic aromatic;

hetaryl is a heteromonocyclic aromatic or heterobicyclic aromatic containing 1 to 6 hetero-atoms selected from oxygen, sulfur and nitrogen;

aralkyl is a carbomonocyclic aromatic or carbobicyclic aromatic substituted with a straight or branched chain C<sub>1-15</sub> alkyl; and

substituent is a member selected from the group consisting of halogen, C<sub>1-4</sub> alkyl, C<sub>1-4</sub> haloalkyl, C<sub>1-4</sub> haloalkoxy, C<sub>1-4</sub> alkoxy, C<sub>1-4</sub> alkylthio, hydroxy, carboxy, cyano, nitro, amino, mono- or di-C<sub>1-4</sub> alkylamino, formyl, mercapto, C<sub>1-4</sub> alkyl-carbonyl, C<sub>1-4</sub> alkoxy-carbonyl, sulfo, C<sub>1-4</sub> alkylsulfonyl, carbamoyl, mono- or di-C<sub>1-4</sub> alkyl-carbamoyl, oxo, and thioxo.

4. A compound according to claim 1, wherein n is 1;

R<sub>1</sub> and R<sub>2</sub> are each independently a member selected from the group consisting of hydrogen, straight or branched chain C<sub>1-6</sub> alkyl, phenyl, naphthyl, hetaryl, C<sub>1-6</sub> alkyl substituted with at least one substituent, straight or branched chain C<sub>1-6</sub> alkylphenyl, phenyl substituted with at least one substituent, benzyl, and benzyl substituted with at least one substituent;

R<sub>3</sub> is a member selected from the group consisting of hydrogen, C<sub>1-6</sub> alkyl, aralkyl, C<sub>1-6</sub> alkyl substituted with at least one substituent, CO-R<sub>5</sub>, or SO<sub>2</sub>-R<sub>5</sub>; CO-O-R<sub>5</sub>, CO-N-R<sub>4</sub>, and R<sub>5</sub>;

R<sub>4</sub> and R<sub>5</sub> are each independently a member selected from the group consisting of hydrogen, C<sub>1-6</sub> alkyl, C<sub>1-6</sub> alkyl substituted with at least one substituent, cycloalkyl, phenyl, and phenyl substituted with at least one substituent, aralkyl, benzyl, and benzyl substituted with at least one substituent; and

substituent is a member selected from the group consisting of halogen, C<sub>1-4</sub> alkyl, C<sub>1-4</sub> haloalkyl, C<sub>1-4</sub> haloalkoxy, C<sub>1-4</sub> alkoxy, C<sub>1-4</sub> alkylthio, phenoxyl, halophenoxy, phenylthio, pyridylthio, hydroxy, carboxy, cyano, nitro, amino, C<sub>1-3</sub> alkanoylamino, mono- or di-C<sub>1-4</sub> alkylamino, 4- to 6-membered cyclic amino, formyl, mercapto, C<sub>1-4</sub> alkyl-carbonyl, C<sub>1-4</sub> alkoxy-carbonyl, sulfo, C<sub>1-4</sub> alkylsulfinyl, C<sub>1-4</sub> alkylsulfonyl, C<sub>1-3</sub> alkanoyl, benzoyl, mono- or di-C<sub>1-4</sub> alkyl-carbamoyl, oxo, thioxo, and 5 to 10 membered heterocyclic.

5. A compound according to claim 1, wherein n is 1, and with reference to R<sub>1-5</sub>,  
10 whenever the following are used;

alkyl is a straight or branched chain C<sub>1-15</sub>;

alkenyl is a straight or branched chain C<sub>2-18</sub>;

aryl is a carbomonocyclic aromatic or carbobicyclic aromatic;

cycloalkyl is a C<sub>3-8</sub> alkyl ring,

15 hetaryl is a heteromonocyclic aromatic or heterobicyclic aromatic containing 1 to 6 hetero-atoms selected from the group consisting of oxygen, sulfur and nitrogen;

aralkyl is a carbomonocyclic aromatic or carbobicyclic aromatic and substituted with a straight or branched chain C<sub>1-15</sub> alkyl;

20 hetaralkyl is a heteromonocyclic aromatic or heterobicyclic aromatic containing 1 to 6 hetero-atoms selected from the group consisting of oxygen, sulfur, and nitrogen and substituted with a straight or branched chain C<sub>1-15</sub> alkyl; and

25 substituent is a member selected from the group consisting of halogen, C<sub>1-4</sub> alkyl, C<sub>1-4</sub> haloalkyl, C<sub>1-4</sub> haloalkoxy, C<sub>1-4</sub> alkoxy, C<sub>1-4</sub> alkylthio, phenoxyl, halophenoxy, phenylthio, pyridylthio, hydroxy, carboxy, cyano, nitro, amino, C<sub>1-3</sub> alkanoylamino, mono- or di-C<sub>1-4</sub> alkylamino, 4- to 6-membered cyclic amino, formyl, mercapto, C<sub>1-4</sub> alkyl-carbonyl, C<sub>1-4</sub> alkoxy-carbonyl, sulfo, C<sub>1-4</sub> alkylsulfinyl, C<sub>1-4</sub> alkylsulfonyl, C<sub>1-3</sub> alkanoyl, benzoyl, mono- or di-C<sub>1-4</sub> alkyl-carbamoyl, oxo, thioxo, and 5 to 10 membered heterocyclic.

30 6. A compound according to claim 1, wherein n is 1;

R<sub>1</sub> and R<sub>2</sub> are each independently a member selected from the group consisting of straight or branched chain C<sub>1-6</sub> alkyl, phenyl, benzyl, naphthyl, straight or branched chain

C<sub>1-6</sub> alkyl substituted with at least one substituent, phenyl substituted with at least one substituent, and benzyl substituted with at least one substituent;

R<sub>3</sub> is a member selected from hydrogen, straight or branched chain C<sub>1-6</sub> alkyl, C<sub>1-6</sub> aralkyl, C<sub>1-6</sub> alkyl substituted with at least one substituent;

5 R<sub>4</sub> and R<sub>5</sub> are each independently a member selected from the group consisting of hydrogen, straight or branched chain C<sub>1-6</sub> alkyl, straight or branched chain C<sub>1-6</sub> alkyl substituted with at least one substituent, cycloalkyl, phenyl, phenyl substituted with at least one substituent, benzyl, and benzyl substituted with at least one substituent; and  
10 substituent is a member selected from the group consisting of methyl, halogen, halophenyl, methoxy, ethoxy, phenoxy, benzyloxy, trifluoromethyl, t-butyl, and nitro.

7. A compound according to claim 1, wherein n is 1;

15 R<sub>1</sub> is a member selected from the group consisting of straight or branched chain C<sub>1-6</sub> alkyl, and phenyl;

R<sub>2</sub> is a member selected from the group consisting of phenyl, C<sub>1-6</sub> alkylphenyl, C<sub>1-6</sub> dialkylphenyl, C<sub>1-6</sub> alkoxyphenyl, halophenyl, dihalophenyl, and nitrophenyl;

R<sub>3</sub> is a member selected from hydrogen and straight or branched chain C<sub>1-6</sub> alkyl;

20 R<sub>4</sub> is phenyl substituted with at least one substituent selected from the group consisting of halogen, phenoxy, benzyloxy, halophenoxy, straight or branched chain C<sub>1-6</sub> alkyl, C<sub>1-6</sub> alkoxy, and halo-C<sub>1-4</sub> alkyl and;

R<sub>5</sub> is a straight or branched chain C<sub>1-6</sub> alkyl.

8. The compound of claim 1, wherein n is 1;

25 R<sub>1</sub> is phenyl or t-butyl;

R<sub>2</sub> is a member selected from the group consisting of methylphenyl, dimethylphenyl, t-butyl, methoxyphenyl, chlorophenyl, dichlorophenyl, fluorophenyl, and nitrophenyl;

R<sub>3</sub> is hydrogen;

30 R<sub>4</sub> is a phenyl substituted with at least one substituent selected from the group consisting of chlorine, fluorine, phenoxy, benzyloxy, chlorophenoxy, methoxy, ethoxy, and trifluoromethyl; and

R<sub>5</sub> is a methyl.

9. A compound according to one of the claims 1 to 8, wherein said compound has an  $IC_{50}$  less than 10  $\mu M$  in an *in vitro* inhibition of P I 3-K activity or an  $IC_{50}$  less than 20  $\mu M$  in cellular inhibition of P I 3-K activity.

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10. A pharmaceutical composition comprising the compound or a salt thereof according to one of the claims 1 to 8 and a pharmaceutically acceptable carrier.

10 11. A method of screening and characterizing the potency of a test compound as an inhibitor of phosphatidylinositol 3-kinase (PI 3-K) polypeptide, said method comprising the steps of (a) measuring activity of a PI 3-K polypeptide in the presence of a test compound according to one of the claims 1 to 8; (b) comparing the activity of the PI 3-K polypeptide in the presence of the test compound to the activity of the PI 3-K polypeptide in the presence of an equivalent amount of a known PI 3-K inhibitor as a  
15 reference compound, wherein lower activity of the PI 3-K polypeptide in the presence of the test compound than in the presence of the reference compound indicates that the test compound is a more potent inhibitor than the reference compound, and higher activity of the PI 3-K polypeptide in the presence of the test compound than in the presence of the reference compound indicates that the test compound is a less potent inhibitor than the  
20 reference compound.

12. A method to treat a disorder in which P I 3-K plays a role, comprising administering to a patient with said disorder an effective amount of the compound or a salt thereof according to one of the claims 1 to 8.

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13. A method according to claim 12, wherein the disorder is a cancer or a disease of immunity and inflammation.

30 14. A method according to claim 12, wherein the disorder is disruption of PI 3-K function in leukocytes.

15. A method for inhibiting growth of cancer cells, comprising contacting said cancer cells with an effective amount of the compound or a salt thereof according to one of the claims 1 to 8.

5           16. The method according to claim 15, wherein said cancer cells are altered in PI 3-K mediated signaling via mutation in PTEN, amplification of the PIK3CA gene or mutations in PI 3-Kinase.

10           17. The method according to claim 15, wherein said cancers include breast, prostate, colon, lung, ovarian, and other cancers having altered PI 3-K activities.

          18. A method for affecting PI 3-K mediated signaling in cells comprising contacting said cells with an effective amount of the compound or a salt thereof according to one of the claims 1 to 8.

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          19. The method according to claim 18, wherein said compounds affect PI 3-K mediated phosphorylation of Akt.